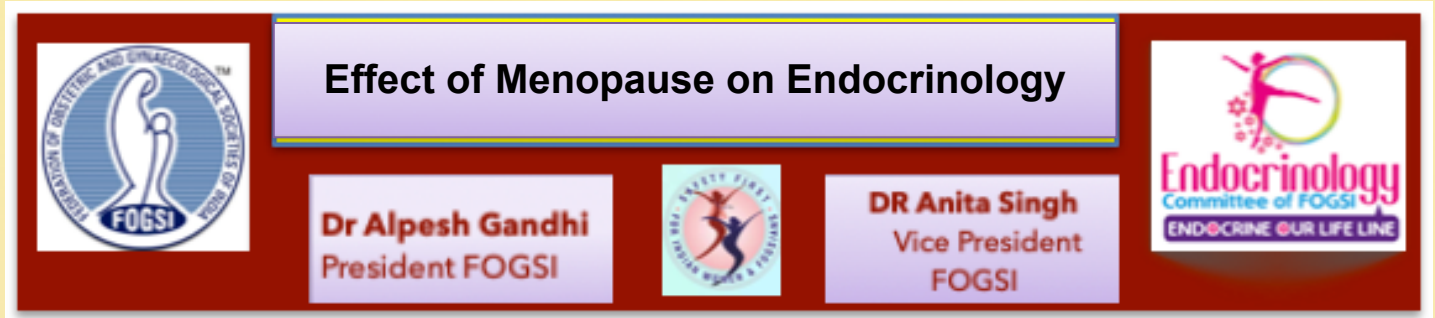
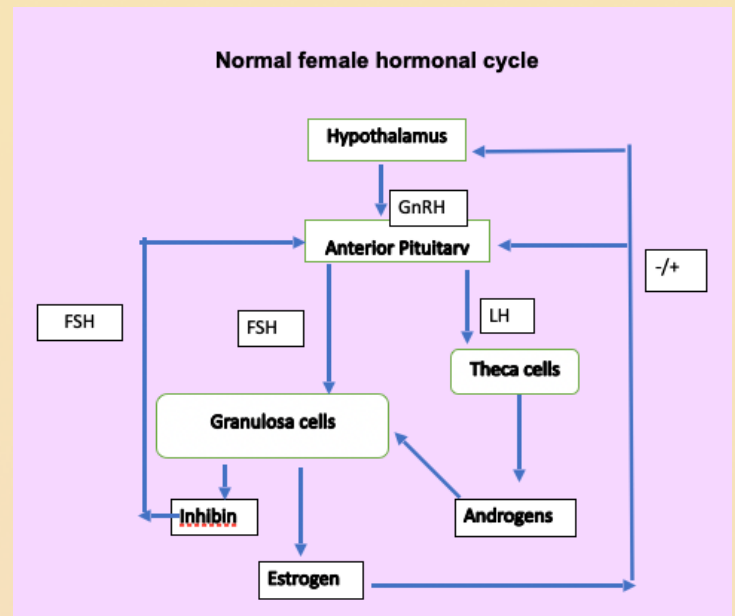




Introduction

The WHO defines Menopause as the permanent cessation of menstruation due to loss of ovarian follicular function or surgical removal of the ovary.

This phase sees a lot of hormonal changes, in the form of disruption and this changed hormonal milieu creates various symptoms needing further investigations, interventions and medication.



Changes in the hormonal pattern during menopause¹

There is decline in the peripheral levels of Oestrogen and Testosterone while LH, FSH and SHBG increase. GH, Insulin like growth factor-I and DHEAS also decrease.

Hormones	Concentrations
Estradiol	<10–40 pg/ml
Estrone	<10–50 pg/ml
FSH	30–240 mIU/ml
LH	30–220 mIU/ml
Androstenedione	600–1200 pg/ml
Testosterone	150–350 pg/ml
Prolactin	5–20 ng/ml

(Table source: 2007 Pathological Society of Great Britain and Ireland.)

What is the source of oestrogen in menopause? ²

Oestrogen is produced in a number of extra gonadal sites including the mesenchymal cells of adipose tissues of the breast, osteoblasts and chondrocytes of bone, the vascular endothelium, aortic smooth muscle and brain.

The other forms are obtained from peripheral conversion in the adipose tissue:

Androstenedione → Estrone
Testosterone → Estradiol

Effects, symptoms and impact of hormones post menopause

1. Metabolic Syndrome (MS)^{3, 4}

This is a group of factors which show a risk of future development of Type 2 Diabetes Mellitus and Cardiovascular diseases. These are dysglycaemia, dyslipidaemia, central obesity, and hypertension. A changing hormonal environment with decreasing estrogen and alteration of its ratio with testosterone is the causative factor for MS.

A) Type 2 Diabetes and insulin resistance

After menopause as the body changes from gynoid to android pattern, there is increased central abdominal fat associated with a decline in circulating adiponectin. This is associated with insulin resistance (IR) and diabetes.

Risk factors

- Decreased pancreatic beta-cell function
- Decreased insulin sensitivity

B) Cardiovascular Disease (CVD)



Since ovarian function protects against CVD, there is an increased incidence of CVD post menopause. There occurs:

- Increased HDL lipoprotein synthesis
- Decreased HDL clearance
- Increased total cholesterol
- Increased LDL
- Increased triglycerides

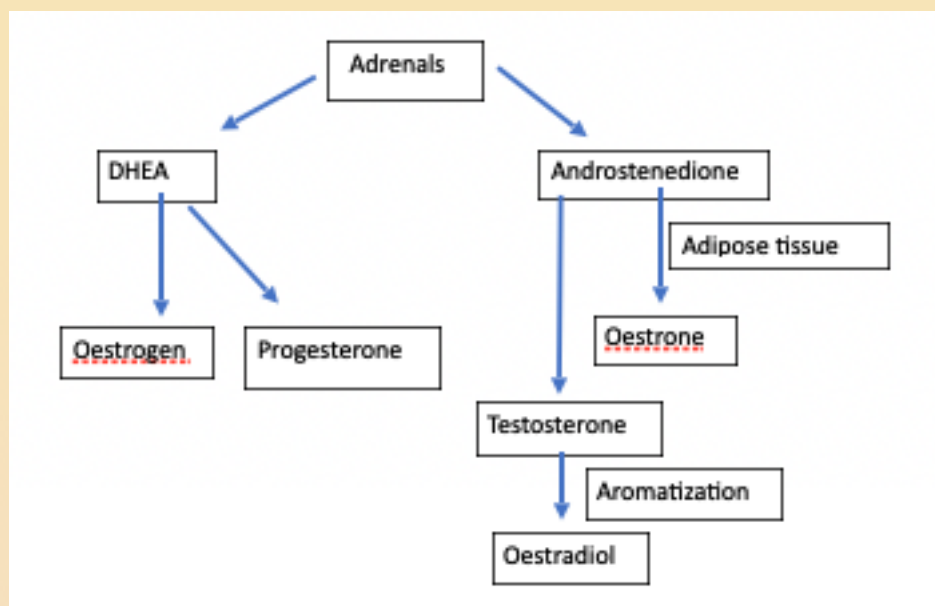
All these lead to increased atherogenesis.

2. Thyroid and Menopause⁵

- There is a high level of TSH in post-menopausal women.
- The symptoms of thyroid disease may mimic post-menopausal complaints and therefore the diagnosis is tricky.
- Even a mild thyroid failure could lead to depression, memory loss, cognitive impairment and a myriad of neuro-muscular complaints.
- Myocardial function could also be slightly impaired causing an increased Cardiovascular risk. Therefore, a routine screening of thyroid function in the postmenopausal period is recommended.
- Thyroid hormones play a dominant role in bone metabolism. Patients with previous h/ o thyrotoxicosis and subsequent L-thyroxine treatment are associated with reduction of femoral and vertebral bone density in post-menopausal women and cardiac arrhythmias.
- Menopause may modify the clinical expression of some thyroid diseases, particularly the autoimmune ones.
- Nodular goitre and cancer are highest among post-menopausal women.

3. Adrenals and Menopause

The Ovarian production of oestrogen is taken over by adrenals in menopause. It is therefore crucial that adrenal health is maintained optimally.



4. Endometriosis⁶

Once established, endometriosis can persist in the presence of low circulating levels of oestrogen in the post-menopausal period. Local oestradiol production by endometriotic tissues keeps the disease going through autocrine and paracrine effects. However, if the disease occurs in the post-menopausal period, it is enhanced in the presence of higher circulating levels of estrogen.

Risk factors

- Unopposed Oestrogen
- Obesity

5. Genito-urinary symptoms

- Vaginal atrophy leading to vaginal dryness.
- Urethral mucosa atrophy leading to pollakiuria, the benign urinary frequency.
- Bladder mucosa atrophy leading to urge incontinence.

6. Dermatoses⁷

- Decreased Progesterone increases the impact of androgen on the sebaceous glands and skin.
- Decreased Oestrogen slows down mitotic activity, reducing synthesis of collagen.
- There occurs skin atrophy, loss of scalp hair and atrophy of vaginal mucosa.

7. Psychological symptoms

1. Depressive symptoms
2. Memory changes
3. Inability to concentrate
4. Sleep disorders
5. Decreased sexual interest

8. Vasomotor symptoms

- Also called menopausal flushing/ flashes.
- Sudden feeling of heat, rapid heartbeat, with reddening of face, neck and upper chest, accompanied by discomfort and sweating lasting for 3-5 minutes.
- This is due to dysfunction of thermo-regulatory mechanism; the site being the central catecholamine system.
- The cause being the pulsatile release of LH.

9. Vitamin D deficiency

The association of Vitamin D deficiency due to Oestrogen deficit during menopause and the increased risk of chronic diseases like cancer, cardio-vascular disease and type 1 and 2 diabetes suggests that Vitamin D deficiency during menopause affects a wide range of acute and chronic diseases.



10. Postmenopausal Hyperandrogenism⁸

a) Androgenetic Alopecia (AGA)

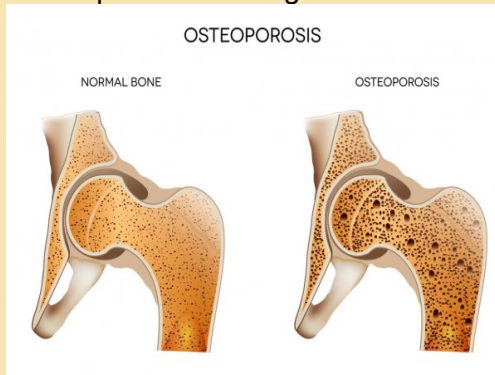
This may be of gradual onset leading to increased hair shedding leading to total denudation.

b) Hirsutism

- It is genetic in origin with an increased amount of testosterone. Because of the reduction in progesterone, the impact of androgens on the sebaceous glands and hair follicles increases leading to increased hair growth.
- A state of relative or absolute androgen excess either from the adrenals or the ovaries is clinically manifested as the appearance and/or increase of hair growth or virilization.
- Underlying potentially life-threatening adrenal androgen secreting tumours have to be excluded.

11. Osteoporosis⁹

Estrogen deficiency impairs the bone turnover cycle because of the presence of oestrogen receptors in osteoclast progenitor cells and osteoclasts. The osteoclastic activity increases while the osteoblastic activity decreases. As a result, the amount of bone resorbed is more than the amount deposited causing a net loss of bone.



(Image Source: free vector stock)

12. Changes in Growth Hormone and Insulin-like Growth Factor 1

Growth hormone (GH) is a pulsatile hormone released from the anterior pituitary under hypothalamic regulation by Growth hormone-releasing hormone (GHRH) and inhibitory regulation by Somatostatin.

There is a co-relation between oestrogen and GH secretion.

Thus, in a decreased estrogenic environment, such as in menopause, there is decreased GH secretion.

Conclusion:

Menopause is a natural change which sees a myriad of hormonal changes which are responsible for diseases which could respond to HRT which is patient specific. Many such changes can be detected if done at the right time. It is therefore important for clinicians to look for signals and help alleviating menopausal maladies.



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The Menopause

As I struggle to catch a little sleep
Hot flushes and sweats into my world creep
My heart and pulse are mounting to race
Its difficult with the daily grind to keep pace
Whats it? there's a hue, cry and uproar?
Its the brittle hair strewn all over the floor
The fat peeps from all over as multiple folds
"Have pity" pleads my blouse "no more can I hold!"
The belly tries to push itself and sit in gay abandon
Exercise and diet control are easier said than done
My pigmentation and crow feet get difficult to conceal
I feel tired ; where's my zest and zeal?
Thyroid and diabetes are on the prowl
Why am I irritable? Why do I scream and howl?
As I meet my gynac to know the cause
She smiles and says "its the menopause"
From MENarche, MENorrhagia to MENopause you'll find
The MEN are the only reasons behind !

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